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NONENGINEERING ASPECTS OF METROPOLITAN
WATER SYSTEMS PLANNING

A THESIS

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by
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WATER SYSTEMS PLANNING

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SUMMARY

The most troublesome obstacles to providing successful metropolitan water service are encountered in trying to plan, organize, and finance a water system that will service numerous governmental jurisdictions. This thesis was undertaken to explore alternative methods of planning, organizing, and financing such a system. The problem is approached in two ways. First an examination is made of various nonengineering studies which are essential to planning metropolitan water service. Next, a detailed analysis is made of one of these nonengineering studies, the study of organizational alternatives which can provide water supply service on a metropolitan scale. Four basic alternatives are analyzed. They are cooperative agreements, metropolitan districts, metropolitan authorities, and federated metropolitan governments. Each of these is examined from the standpoint of its characteristics; its advantages and disadvantages; the methods by which it may be established; its organization, administration, and procedures for either extending its boundaries or admitting new members; its powers and duties; and the methods of financing its operations.

The examination of these alternatives showed that all have successfully provided water service on a metropolitan basis. Since each alternative has advantages and disadvantages which the others do not have,

no one of them can be considered the best possible method for providing metropolitan water service in every situation. However, federated metropolitan government seems to offer the best possibility for providing unified governmental services throughout the metropolitan area. By placing water service under a department of the metropolitan government, this arrangement eliminates the need for cooperative agreements, metropolitan districts, authorities, or any other possible organizational alternative for providing service. However, the metropolitan federation is by far the most difficult alternative to establish.

CHAPTER I

INTRODUCTION

Closely associated with metropolitan water supply are the engineering facilities such as pipe lines and pumping stations, reservoirs and treatment plants. These facilities, of course, are vital to water service, but there are other aspects, perhaps not as customarily associated with water supply, that are equally important. These are the nonengineering aspects. They include nonengineering studies which preface water-service planning, such as studies of population growth, land use patterns, and water consumption trends. In addition to these studies of conditions within the metropolitan area, nonengineering aspects also include the agencies which can provide water service and the methods of organizing them and of financing their operations.

Background

Most of the problems encountered in providing water service in metropolitan areas can be reduced to four basic factors. These are rapid metropolitan growth, the rising per capita rate of water consumption, the "piecemeal" approach to water service, and the overabundance of political units in metropolitan areas.

Metropolitan growth. --In 1940, 69 million Americans lived within 140 metropolitan districts. By 1950, 84 million resided within 168 standard metropolitan areas. The standard metropolitan area, as defined in the 1950 census of population, is a contiguous area which is inhabited primarily by non-agricultural workers and which contains at least one city of 50,000 or more inhabitants. By 1960, an estimated 109 million people were contained within 192 standard metropolitan areas.

This rapid urbanization is magnifying the demands for water in these relatively small geographic areas.

Rising demands for water. --The population of the United States has doubled since 1900, but the annual consumption of water has quadrupled during this period.¹ This rising rate of use is largely due to the soaring demands on water resources for agricultural, industrial, and domestic purposes. In urban areas, industrial and domestic water consumption accounts for 70 per cent of all water consumed. The other 30 per cent is attributed to consumption for public purposes and to loss from waste.²

The rapidly increasing use of water for industrial purposes was studied by the President's Materials Policy Commission which estimated that, by 1975, industries would be using 60 per cent of the total water consumed in this country whereas in 1950 they used an estimated 40 per cent.³ This is important because most industries locate in and around urban centers.

Per capita consumption of water for domestic purposes is also rising sharply. This is attributed to two factors. One is sewage disposal by either septic tanks or public sewerage systems. The other factor is the use of such modern water using appliances as washing machines, automatic dishwashers, garbage disposal units and air conditioning units.

"Piecemeal" approach. --Water service in this country has been traditionally furnished on a "piecemeal" basis. With this approach, each municipality supplies the needs of its residents and sometimes sells surplus water to residents living outside the city limits. However, this method has not proved adequate in metropolitan regions. In many instances, the task of providing the tremendous quantities of water needed in metropolitan areas has become very costly for each individual municipality. The \$220,000,000 construction bond issue which was needed to finance a supply of water for the Los Angeles metropolitan area is an example of the magnitude of expenditures sometimes needed to provide water in metropolitan areas.

Multiplicity of political units. --Within the overall pattern of metropolitan growth, there is a trend for metropolitan area residents to settle in suburban sections--a trend which is intensifying water-service problems by dispersing residents over a large area and encouraging the creation of new political units. Between 1940 and 1950, for example, the rate of population increase in central cities was 13.9 per cent, while in outlying parts of standard metropolitan areas it was 35.9 per cent. To provide for the needs

of those people who settled outside the central city, new political subdivisions have been formed. By 1958, there were over 15,000 local governments within the 174 standard metropolitan areas--an average of over 86 governments for each area.⁴

When several political units within one metropolitan area must provide their own water service, the result is frequently duplication of expenditures for such items as administration, personnel, and treatment and storage facilities.

Purpose

It is the purpose of this thesis to examine various nonengineering studies which are essential to metropolitan water service planning and to conduct a detailed analysis of one of these, the study of organizational alternatives to provide water supply service on a metropolitan scale. These alternatives will be discussed from the standpoint of how they are created, how they are administered, the powers which are given them, the duties which they perform, and the methods of financing them. On the basis of this review and analysis, conclusions will be drawn as to the relative merits of these agencies, and recommendations will be made with respect to the conditions under which each alternative might be the most effective means of organizing water service.

This information should be valuable to the city planner in his role of advising local governments in metropolitan areas as to the various possibilities of organizing metropolitan water service.

Need

The most troublesome obstacles to successful metropolitan water service planning are encountered in trying to plan, organize, and finance a water system that will serve numerous governmental jurisdictions. As shown by the technological accomplishments which have delivered water to many metropolitan areas, the engineering problems have been skillfully resolved through the years. However this cannot be said of problems of organization. In a paper on water service planning, Dr. Abel Wolman stated: "Where the actual execution of solutions has lagged, the causes have been essentially of a political, administrative or fiscal nature."⁵

Today's great challenge in the field of metropolitan water supply planning lies in solving problems of organizing and financing water service.

Approach

The following studies will be discussed as they pertain to water service planning: population, land use, transportation, economy, inter-governmental relations, water use trends, and possible alternative for organizing metropolitan water service.

A detailed investigation will be conducted of the latter study. This investigation will include an analysis of four basic organizational alternatives under which metropolitan water service may be provided. These alternatives are cooperative agreements, metropolitan districts, authorities, and federated metropolitan governments. Each will be examined from the standpoint of its characteristics; its advantages and disadvantages; the

methods of establishing it; its organization, administration, and procedures for admitting new members; its powers and duties; and the methods of financing its operations.

Description of Terms

The various organizational alternatives which will be treated and the titles of subsections which will be discussed under each alternative are described below as they will be used for the purpose of this study.

Methods of establishment. --Organizational alternatives which may provide water service in metropolitan areas are created in various ways. The action to create such an organization might originate at the state or territorial level, as was the case with the Metropolitan Water District of Massachusetts and the Puerto Rico Aqueduct and Sewerage Authority. These two organizations were created as state controlled agencies by the Massachusetts and Puerto Rican legislatures. More often, the action to create an agency which can provide water service originates first when local governments agree that such an organization is needed and then petition the state government to pass the necessary legislation. When the action is initiated locally, it usually must be approved by the citizens who will have to pay the costs of the organization. Sometimes metropolitan water services may be achieved without creating a separate agency. Such is the case with cooperative agreements in which a central city agrees to sell water to surrounding local governments. In this event, water services may be provided without the need for either state enabling legislation or a local referendum.

Organization, administration, and membership. --Agencies which provide metropolitan water service are usually governed by a board or commission which is responsible for establishing the policies of the organization and for seeing that these policies are put into effect. This section will discuss the organization of such an administrative body, the selection of its members, the number of representatives on it, and the voting procedures of the board. In addition, policies for adding new members or new territory will be discussed.

Powers and duties. --Organizations which provide metropolitan water service have powers with which to carry out their functions. These powers may include such things as the right to make rules governing their operations, the right to borrow, the right to levy taxes, and the right of eminent domain. The powers which the organization is given depend to some extent upon the type of organization that is providing water service. For example, the metropolitan district may be given the power to tax, but the authority may not. Of the four alternatives under consideration, cooperative agreements usually involve the delegation of the fewest powers.

The types of duties which a metropolitan water system may perform range from selling raw water at wholesale to selling treated potable water at retail. The water service organization which sells water at wholesale is responsible only for providing an adequate supply of water to its members. Each local government which receives this water is in turn responsible for distributing it to local consumers. The water system

which retails water assumes the responsibility of distributing this water to individual consumers within the local governments served by the water retailer.

Organizations established under any of the four alternatives being considered may perform either of these functions or provide any inter-media to service such as selling treated water at wholesale.

Financing. -- Basically there are two types of costs which must be met by the metropolitan water system. The first are the capital costs, which include both interest and debt retirement payments on money borrowed for original construction or new additions. The second are the operating expenses which include both the expenses incurred in operating the system and the cost of maintenance. To meet capital costs and operating expenses, metropolitan water systems must rely on one or more of three major sources of income. These are taxation, revenues from the sale of water, and admission charges to new members. While some systems receive income from all three sources, others depend on income from only taxation and water sales. Still others derive their income entirely from revenues from the sale of water.

Cooperative agreements. -- Cooperative agreements are agreements or pacts between two or more units of government for the provision of water service. These agreements may take various forms such as a central city undertaking service to other municipalities or unincorporated areas, or such as two or more governmental units jointly financing and sharing a water system.

Metropolitan districts. --Metropolitan districts are created for the purpose of performing a service on an area-wide basis where for some reason this service cannot be carried out as well by the individual local governments. This service may be only water supply or it may include other functions such as sewage and refuse disposal. State enabling legislation is ordinarily needed to authorize the creation of the metropolitan district which is usually governed by an appointed or elected board.

Authorities. --Authorities are quasi-public corporations established to provide water service in areas where the jurisdiction of one or more state or local governments is involved. Usually an appointed administrative board is given specified corporate powers needed to carry out the functions of the authority.

Federated metropolitan governments. --The form of metropolitan government discussed in this study is the so-called federated metropolis, an arrangement whereby services and functions which are considered metropolitan in scope are performed by a central organization, while services and functions considered local in nature are administered by the cities which make up the metropolitan area. Control over the central government is usually exercised by a council or commission made up of representatives from the local governments.

Water service is carried on as one function of the metropolitan government.

CHAPTER II

NONENGINEERING STUDIES ESSENTIAL TO WATER-SERVICE PLANNING

Considerable research is essential before specific plans can be devised for providing metropolitan water service. Much of this research is in the form of engineering and nonengineering studies. It is in the preparation of the nonengineering studies that the city planner can make a contribution to water-service planning. The nonengineering studies which the planner should conduct are of two types. First are the basic studies which the planner must undertake in connection with his overall planning program. Next are the special studies which will be undertaken specifically in connection with water-service planning.

Basic Studies

The basic studies include investigations of population, land use, transportation, and economy.

Population. -- Any plan to provide water service in a metropolitan area should be based on a carefully considered estimate of future population since the population of an area will determine the water requirements. Water requirements will determine the need for constructing or expanding such facilities as treatment plants or reservoirs. Estimates are needed

not only of the overall population change, but also of population distribution--where the new populations will concentrate and what will be their densities. These forecasts indicate where facilities such as feeder mains and pumping stations will be needed within the metropolitan area.

Estimates of population change and population distribution provide a basis for planning today's facilities to meet tomorrow's demands.

Land use. --A plan for future land-use development in the metropolitan area is a necessary tool for planning the extension of water service because the knowledge that an area is to develop residentially, commercially, or industrially will help determine the water service that will be required when this development takes place. Those responsible for extending water service throughout the metropolitan area will find the future land-use plan a valuable guide for planning distribution facilities. For example, if a feeder main is to be extended through an area which is slated for high density residential development, the water system planner would want to consider a main which would be large enough to meet the demands of the residential area when it develops. By seeing that a main is installed which will be able to serve the future demands of an area, the planner can help avert the expense of having to replace the original facility or of having to install an auxilliary main.

Transportation. --A plan for the development of a transportation network of roads and rails within the metropolitan area is important in the planning of water service because the use of land and the distribution of population

are influenced by the availability of transportation. Where transportation is provided, new development generally follows. Therefore, if new highways, rapid transit lines, or suburban railroad lines are planned in sparsely developed sections of a metropolitan area, the completion of these facilities can be expected to open the area to new development that will require the provision of water service. Any proposed transportation scheme for the metropolitan area should be studied in connection with water service planning to determine how it will affect future demands for water.

Economy. --The economy of a metropolitan area is important in water service planning because the economic base offers a clue to probable future population growth. If the production of goods and services is increasing, wage earners and their families will be attracted to the area, and the resulting rise in population may be expected to bring a proportional rise in the demands for water. Because of this, it is important for the planner of water service to have a knowledge of the probable economic future of the area. In addition, a knowledge of the economic condition of municipalities within the metropolitan area will help determine what methods should be used to finance the water system. Since metropolitan water service is usually financed jointly by the local governments receiving the service, agreement must be reached upon a method of financing which is feasible for the municipalities involved. A city deeply in debt may be forced to base its share of the financing costs entirely on water revenues while

another more solvent city might base its share partly on property taxes. Both the financial condition and the economic base of an area have a bearing on financial planning for water service.

Special Studies

Special studies include a survey of intergovernmental relations, water-use trends, and methods of organizing and financing metropolitan water systems.

Survey of intergovernmental relations. --The provision of metropolitan water service requires local governments to cooperate in organizing, administering, and financing the water system. Therefore, those responsible for organizing water service should know whether the local governments have worked together in the past or whether there has been a lack of cooperation and a history of conflicts and disputes. A record of cooperation or lack of cooperation might influence the selection of an organizational alternative. For example, in an area with a history of municipal conflicts, cooperative agreements may prove to be the most expedient method for providing water service because they are contracts for water service between local governments and ordinarily require less negotiation and compromise to effect than do metropolitan districts, authorities or metropolitan federations.

Water-use trends. --Future demands for water are dependent to a large extent upon trends in water consumption for that particular area. Consequently, water-service planning must take into account these trends, both

the changing domestic per capita consumption and the changing industrial consumption per unit of output. A reasonable forecast of the future demands for water can be made only by combining estimates of population increase and industrial expansion with estimates of future per capita consumption of water and of future industrial consumption of water per unit of output. It must be kept in mind when these estimates of future water-use trends are prepared that an increased industrial output does not necessarily mean that industrial water consumption will rise proportionately. Technology might find ways of reducing the quantity of water needed per unit of output.

Possible alternatives for organizing metropolitan water service. -- Those who plan for metropolitan water service must be informed of the possible alternatives for providing this service. Such an investigation would involve the various alternatives, their organization and administration, their powers and duties, and the methods of financing their operation. This topic, which forms a primary consideration of this study, will be treated in detail in the following chapter.

These studies, both basic and special, are in many cases so closely related that one cannot be conducted independently of the others. In fact, they should not be separated. They are the groundwork for water service planning in the metropolitan area, and the information which they reveal determines the necessity, the desirability, and the feasibility of a metropolitan water system. They should be compiled for the purpose of water

service planning as a unified report by a single department of government so that the relationships between the elements of the individual studies will not be overlooked. Perhaps no other government office in a metropolitan area is better equipped to perform a task of this nature than is the planning office. The planner is trained to make surveys of this type and to evaluate the findings. In addition, the files of the planning office usually contain much of the information which is needed for these non-engineering studies.

CHAPTER III

ORGANIZATIONAL ALTERNATIVES FOR WATER SERVICE IN METROPOLITAN AREAS

This chapter analyzes cooperative agreements, metropolitan districts, authorities, and federated metropolitan governments, four alternatives under which water service on a metropolitan basis may be provided. The information included here should give the planner and the planning commissioner a basic understanding of these alternatives and should also serve as a basis for further research.

Cooperative Agreements

Cooperative agreements are contracts between units of government for providing water service. These agreements may take many forms. A central city might sell either raw or treated water at wholesale from its system to the water systems of surrounding local governments. For example, the municipal water department of Washington, D. C. sells treated water to nearby Virginia cities and counties. Cooperative agreements may provide for stand-by or emergency service. For example, the water system of one local government might take water from the system of another in event of a fire or some other emergency that created an unusually high demand for water. Cooperative agreements may provide

for the sale of water at retail by one local government to other political units. There are also cooperative agreements under which two or more local governments jointly organize and construct a water system for their use. Examples are the joint supply system constructed to distribute treated water at wholesale to residents of the Massachusetts cities of Salem and Beverly and the joint supply system constructed to wholesale raw water to the water systems of the Michigan cities of Saginaw and Mid-lands.⁶

Advantages and disadvantages. -- An important advantage of the cooperative agreement is its flexibility. The agreement can be used to overcome a wide range of water-supply problems because of the large number of possible variations for providing water service under cooperative agreements. Another advantage is that cooperative agreements usually do not have to be authorized by state legislatures since most local governments have authority to contract with each other. However, in some states, state legislative action is required. The Salem-Beverly agreement, for example, was authorized by the Massachusetts legislature.

An objection to the cooperative agreement is that it tends to be limited in scope. It does not often provide water service for an entire metropolitan area. The agreement frequently includes a limited number of participants, and other local governments within the metropolitan area are left to make their own arrangements for water service. Because of this, the cooperative agreement has generally been regarded as a stop-gap solution to water

supply problems, somewhat less desirable than organizational alternatives which provide water service for an entire metropolitan area.

Methods of establishment. --Most often, cooperative agreements are authorized by the legislative bodies of the participating governments. The advantage of this method of establishment is that once the terms of the contract have been arranged by local government officials, the agreement can be quickly ratified and put into effect. However, this advantage is nullified in states which require state legislative authorization for cooperative agreements.

Organization, administration, and membership. --Ordinarily there are no special administrative bodies established to carry out cooperative agreements, but when a new water system is constructed as a result of a cooperative agreement, a board or commission may be created to administer the system. Both the Salem-Beverly and the Saginaw-Midlands joint-supply systems have administrative boards. The Saginaw-Midlands board consists of six members, three from each city, appointed by the respective city councils for staggered six-year terms. The staggered term is advantageous because it assures that there will always be experienced members on the board. The Saginaw-Midlands administrative board is responsible for managing the system. A superintendent oversees the daily operations.

Cooperative agreements generally do not contain provisions for extending water service to non-members. However, joint-supply systems such as those constructed by Salem-Beverly and Saginaw-Midlands may sell

limited quantities of water to non-members. The Saginaw-Midlands system sells about one per cent of its water to such customers, but the Salem-Beverly system, which is permitted to sell water to two neighboring towns, has never sold water to either of them.

Powers and duties. -- Since the cooperative agreement is a contract and not an ad hoc agency, corporate powers are ordinarily not granted to the water systems established under this organizational alternative.

Unlike authorities and metropolitan districts which may carry out functions other than water service, cooperative agreements for water service are concerned only with this enterprise. The types of water service provided by a cooperative agreement may vary widely. The Saginaw-Midlands system, for example, sells raw water at wholesale to these two cities, while the Salem-Beverly system not only provides treated water but also distributes it to local customers in Salem and Beverly.

The unified treatment and distribution service of the Salem-Beverly joint-supply system eliminates the expense of operating duplicate treatment and distribution facilities such as those of the Saginaw-Midlands system. However, when Saginaw-Midlands was established, each city already had its own treatment plant and distribution system.

Financing. -- Construction funds for water systems established by cooperative agreements are provided by the participating communities who may obtain the required funds from various sources. The city of Saginaw obtained its funds from two sources, water department earnings and the sale of

revenue bonds, while the city of Midlands raised its share of construction money exclusively from the sale of revenue bonds. Both the cities of Salem and Beverly raised construction funds by selling general obligation bonds.

The share of construction costs which each member must contribute is frequently based upon relative water consumption. For example, when the Saginaw-Midlands agreement was made, the average daily consumption of water was 11.5 million gallons for the city of Saginaw and 10 million gallons for the city of Midlands, a total of 21.5 million gallons. Initial capacity was set at 43 million gallons, twice the daily consumption at the time of the agreement, and the initial costs were apportioned 23/43 to the city of Saginaw and 20/43 to the city of Midlands.

Construction costs of the Salem-Beverly joint supply were based upon estimates of water consumption and were apportioned two-thirds to the city of Salem and one-third to the city of Beverly.

Although the apportionment of operating costs to member governments of joint-supply systems constructed as a result of cooperative agreements is frequently based on each member's actual consumption of water, the apportionment of operating costs for the Salem-Beverly agreement is based upon the original two-thirds--one-third estimate of consumption. This assessment is no longer equitable because, by 1955, the city of Beverly was using an estimated 37 per cent of the water produced by this system. The procedure of basing operating costs on actual

consumption of water seems to be a more equitable method because it assures that each member will pay a share of the operating costs proportional to the water it consumes.

Metropolitan Districts

Metropolitan or special districts are ad hoc agencies established to provide services in metropolitan areas in which for some reason these services cannot be provided as well by the individual local governments. A service area or district is delineated and the responsibility for providing a service such as water supply within this area is given to an administrative board or commission. The board is granted certain corporate rights which it may exercise to effect the service for which it is responsible.

The following metropolitan water districts are discussed in this section:

Metropolitan Water District of Massachusetts. -- This district was established in 1895 to sell raw water at wholesale to the city of Boston and suburban communities within ten miles of the city. The service area has since been extended to fifteen miles, and the district in 1958 provided service to thirty communities with a population of more than 1,600,000.⁷

Greater Winnipeg Water District. -- This district, organized in 1913, sells raw water at wholesale to the city of Winnipeg and thirteen smaller municipalities in Manitoba. In 1955 the area of the district was 261 square miles and its population was 410,000.⁸

North Jersey District. -- This district was established in 1916 to provide water for northern New Jersey cities. There are now twenty municipalities which receive water from this system.⁹

Washington Suburban Sanitary District. -- This district was established in 1918 to sell water at retail to an area of 95 square miles within the Maryland counties of Montgomery and Prince Georges. Its original population was less than 30,000. The district has since been expanded to include an area of 212 square miles with an estimated population of 435,000.¹⁰

East Bay Municipal Utilities District. -- This California district was created in 1923 to distribute treated water wholesale to local governments within the district. The district has been increased in area from 93 square miles to 225 square miles. It now has a population exceeding 1,000,000.¹¹

Greater Vancouver Water District. -- This district was formed in 1924 to wholesale treated water to municipalities within the Greater Vancouver Metropolitan area. By 1956 the district contained 600,000 people and its area was 563 square miles.¹²

Metropolitan Water District of Southern California. -- This district, formed in 1928 to sell raw water at wholesale, is the largest water district in the United States. By 1956 it contained within its boundaries 1,970 square miles, a population of 6,432,000, and serves fifty cities.¹³

Advantages and disadvantages. -- As an agency for providing water service on a metropolitan basis, the metropolitan district offers several advantages. It may, depending upon constitutional or legislative provisions, be created

by a single state or groups of states or by a single local government or a number of local governments and can, therefore, be established to provide water service over a metropolitan or regional area. The district does not have to be coterminous with existing political jurisdictions, but instead, may cut across these boundaries and have such territorial limits as are described in its enabling act or charter. Furthermore, if it is responsible for supplying water in an entire metropolitan area, the district can eliminate competition between local governments for water rights. Finally, the district, through special tax levies, may be able to collect revenues from all property within the district including property which may not be receiving water service but which is increasing in value because of the district's operations.

Against these advantages the metropolitan district has certain disadvantages. Its establishment adds another autonomous agency to the number of governmental and quasi-governmental bodies which already exist, and it takes the control of the service it provides out of the hands of local governing bodies. As quoted in The Government of Metropolitan Miami, Frederick L. Bird stated:

When you stop to think of it, an independent agency in charge of a basic service, that can fix its own rates, determine its own policies for supplying services and making extensions, and formulate and approve its long-range plans, holds an almost dictatorial control over how, and where, and how much a community is to develop residentially, commercially, and industrially.¹⁴

In spite of their disadvantages, metropolitan districts have been able to provide water service on a metropolitan basis in many instances where unified service had theretofore been unavailable.

Methods of establishment. --Metropolitan districts are authorized by state legislatures through either a special enabling act which creates a particular district or a general enabling act which sets forth the rules for establishing such districts within the state. California has a general enabling act which permits two or more local governments to incorporate a water district. This is done by first having the legislative body of each political unit within the proposed district pass a resolution declaring that public necessity requires the establishment of a specified water district, and then by having the voters of each local government adopt the resolution at an election. In some states, such as Massachusetts, the state legislature may initiate the action to create a district. The Metropolitan Water District of Massachusetts was created as a state agency by the Massachusetts legislature.

Organization, administration and membership. --Metropolitan districts are administered by boards or commissions which are responsible for the management and operation of the corporation. The primary function of these boards is to establish district policies such as the rates to be charged for water sold and the procedures for changing the district boundaries. The actual task of managing and operating the water system is given to a superintendent or general manager who is hired by the board.

Board members may be selected in various ways. One such method is by appointment. Board members of the metropolitan water District of Southern California are appointed by the chief executive officers of member municipalities. Board members of the Greater Vancouver Water District are appointed by the local governing bodies of member municipalities. Board members of some districts are appointed by state officials. Such is the case in the Washington Suburban Sanitary District in which the Governor of Maryland appoints one of the three members while the respective boards of the two Maryland counties which the district serves each appoint one of the two other district representatives. Board members of some districts are chosen in a general election as in the case of the East Bay Municipal Utilities District. In still other districts, board members serve as ex officio members. The mayors of member municipalities of the Greater Winnipeg Water District serve as ex officio board members and in addition there are elected representatives from both Winnipeg and St. Boniface.

No one of these methods of selecting board members, either by appointment, election, or ex officio representation, is demonstratively superior to the others. The practice of having members appointed by local government officials gives these officials an indirect control over the administration of the water-service organization, but there is no assurance that qualified persons will be appointed. Ex officio members, especially where they are heads of local governments, as in the Greater Winnipeg

Water District, may be able to bring to the conference table a thorough knowledge of existing water-service facilities, of areas where water service is needed, and of other factors within the area which affect water planning. However, ex officio members may not be able to take enough time from their official duties to effectively administer a metropolitan district. They should probably supplement appointed or elected members. The practice of electing board members assures that appointments to the board will not be given as political favors, but an elected board takes the control of the water-service organization out of the hands of local government officials.

In some metropolitan districts, each municipality has at least one representative on the board, but larger or wealthier municipalities are allowed to have additional representatives. In the Metropolitan Water District of Southern California, for example, each member municipality has one representative, but it may have an additional representative for each 300 million dollars of assessed taxable property within the municipality's boundaries. However, extra representation is not always based on a statistically measurable device. In the Greater Winnipeg Water District, the city of Winnipeg has five representatives, the city of St. Boniface has two, and all other members have one. Winnipeg and St. Boniface were allowed extra representatives because they contributed a large share of the district's original construction costs. The number of additional members permitted them was agreed upon without resorting to any quantitative measurement such as assessed valuation.

The practice of giving each member municipality a representative on the board is not followed in every metropolitan district. The total number of representatives on boards is sometimes fixed by the enabling act or charter, and this number remains constant regardless of the number of local governments within the district. The East Bay Municipal Utilities District, for example, has five board members who represent fifteen local governments within the district.

If every member municipality has one or more representatives on the board, every local government would be assured of a vote on district decisions, but if there are many municipalities represented, the water-system board might become unwieldy. For example, the Metropolitan Water District of Southern California, which allows every local government at least one representative, had twenty-nine board members in 1954. The problem of having too many representatives may be solved if a single board member represents more than one municipality as is done in the East Bay Municipal Utilities District.

More important than the actual number of representatives which it has on the board is the number of votes which each municipality is permitted, because the relative number of votes which its representatives may cast determines how much influence a local government can exert on the operations of the district. In some districts, such as the Washington Suburban Sanitary District and the East Bay Municipal Utilities District, each board member is allowed a single vote, but in others additional votes are given to the board members of larger, more influential municipalities.

The practice of allotting extra votes to the representatives of some municipalities is usually referred to as weighting the vote. Votes are usually weighted only in those districts in which several local governments are represented and in which each member municipality has a representative on the board.

The number of votes which a municipality may cast is often based upon some measurable statistic such as assessed valuation, population, or water consumption. The Metropolitan Water District of Southern California, for example, has a policy of weighting the votes of board members to favor those municipalities with the largest total assessed property values. In this district, one vote is awarded the representative or representatives of each member municipality for every ten million dollars of assessed valuation within the municipal boundaries, but no city is permitted more votes than the combined number of votes of all other members. Los Angeles has fifty per cent of the district voting power, and therefore can block any proposal by other district members, but since the approval of many actions of the board requires a two-thirds majority vote, the other local governments have, in effect, a veto over Los Angeles. However, Los Angeles has an absolute veto since the act creating the district requires all representatives of a municipality to vote together. This means that the assent of a majority of the Los Angeles representatives must be secured before any action can be taken in this district.

Policy decisions for the Greater Winnipeg Water District are normally approved by a simple majority vote of the board members, but the district act provides that votes may be weighted on the basis of assessed valuations. The weighted vote provision was included to assure that in event of an irreconcilable disagreement among the district members, the City of Winnipeg which contributed 85 per cent of the district's initial costs, but which has only five of the district's fourteen representatives, would have the controlling voice in the organization. This provision permits any board member to call for a vote by "municipal representation". Under the terms of "municipal representation" all members of a municipality must vote alike, and one vote is allowed each local government for property within its boundaries up to and including the first five million dollars in assessed value. Still another vote is awarded for each additional five million dollars in assessed value. "Municipal representation" could swing the balance of power to Winnipeg because of this city's greater wealth, but it has never been invoked. To protect other district members against unfair actions by Winnipeg, the district act further provides that any decision which might be arrived at by "municipal representation" may be appealed by any board member to the provincial public utilities board which makes the final ruling.

The apportionment of extra votes in the Greater Vancouver Water District is unusual because the apportionment is not based upon statistically measurable quantities such as population, water use, or assessed value.

Instead, each representative of the city of Vancouver is permitted two votes while all other representatives are permitted one. This double vote theoretically gives Vancouver a controlling voice in the corporation since the district charter allows Vancouver to have one more representative than half of the total number of all other district representatives. As in the Greater Winnipeg Water District, however, policy decisions of the Greater Vancouver Water District Board are ordinarily based upon a simple majority vote, and the double vote for Vancouver's representatives is invoked only upon the special request of a board member. However, the Vancouver provision differs from that of Winnipeg in that the representatives are not required to vote alike, and in the one instance in which the dual vote was invoked, the Vancouver representatives did not vote together.

Although weighting the votes of member municipalities could conceivably result in the domination of district policy by one municipality, the creation of some water districts would have been impossible except for the wealth and influence of one local government. In view of this, it seems justifiable that a city which is instrumental in establishing a water district should have a substantial voice in its operation.

Terms of office served by metropolitan district board members vary widely. Board members of the Greater Vancouver Water District are appointed for one year, board members of the Washington Suburban Sanitary District are appointed for six years, and the mayors of member municipalities in the Greater Winnipeg Water District serve as long as they hold office. Although there is no optimum term of office, a one-year

appointment, unless the board member is reappointed at the end of his term, may not be long enough to give the representatives an effective knowledge of district proceedings.

Most metropolitan districts have authority either to expand the district boundaries in accordance with special procedures or to extend their services to non-members. The North Jersey Water District, for example, was created to supply water to eight northern New Jersey municipalities. The district charter contained no provisions for adding additional territory, and although no other municipalities have been included in the district, the district now supplies water to twelve non-members. The Greater Winnipeg Water District has also refused requests to extend its boundaries, but it, too, sells water to non-member municipalities.

Many metropolitan districts, however, do extend their boundaries from time to time. The procedure for adding new territory frequently involves a referendum of the citizens from the area to be added. However, a municipality seeking admission to the Metropolitan Water District of Southern California may join either by having its citizens vote to join or by merging with a local government which is already a member. If it chooses to enter by referendum, the governing body of the area must submit to its citizens the proposal to join the district upon terms specified by the water district board. An affirmative vote by a simple majority of the electorate is required for approval. An area seeking admission to the East Bay Municipal Utilities District may either hold a referendum which, for affirmative action, requires approval by a simple majority of those

voting, or it may submit a petition to the district board signed by all property owners within the area.

Some districts, such as the Metropolitan Water District of Massachusetts, admit new territory free of charge, while others such as the Metropolitan Water District of Southern California, impose an annexation or entrance fee. Originally the Metropolitan Water District of Massachusetts experimented with an annexation fee based upon the size of the district's sinking fund or the aggregate sum of money which had been set apart to pay off the district's indebtedness. The annexation fee was based upon the size of the sinking fund at the time of the new member's admission. At first the charges were relatively small, less than \$30,000, but as the sinking fund grew, the annexation charge became greater until it reached \$400,000 in 1925. This figure was considered prohibitively high for most communities, and consequently the practice of admitting new territory to the district was discontinued. The district has once more begun expansion of its territory, but an annexation fee is no longer required. The Metropolitan Water District of Southern California, on the other hand, has maintained a substantial annexation charge. New members are charged an amount equal to what would have been derived through tax levies had the area been a part of the district from the beginning.

In comparing the experience of these two districts with annexation charges, it must be recognized that the scarcity of water sources in Southern California compelled local governments to join the district while

in Massachusetts, local water supplies, although limited, have been adequate to serve most suburban areas. Consequently pressures on local governments to join the Massachusetts district have not been as strong as those in California. Furthermore, high fees, comparable to those paid in Southern California, would probably not be acceptable in New England or in any other area where water resources are available for use.

Powers and duties. --Metropolitan districts may be granted a number of corporate powers needed to carry out their purposes. Powers which are commonly delegated to a district include the right to make rules and regulations governing its actions; to acquire, hold, lease and sell real property; to construct, improve, maintain and operate a water-supply system; to levy taxes, and fix the tax rates; to exercise eminent domain; to sue and be sued; to borrow by issuing bonds or debentures secured by taxable property within the district; to fix water rates and service charges; to employ and fix the salaries of water-works personnel; and to exist perpetually.

Exercising these powers gives the metropolitan district a considerable degree of freedom from control by local governments. The district sets its own rules for operating. It may have a self-sustaining income from tax revenues and from revenues for its goods and services. It may borrow money to construct new facilities by issuing obligation bonds which are secured by the district's power to levy taxes on property within its boundaries.

All metropolitan districts, however, are not granted all of the powers listed above. The Greater Vancouver Water District, for example, does not have the power to levy taxes although it may borrow by issuing revenue bonds which are direct obligations and liabilities of the corporation and of each of its member municipalities.

The water-service duties or functions of metropolitan districts usually focus on purchasing or acquiring water and reselling it to participating municipalities or to individual consumers within the metropolitan district. The performance of these duties may take several forms. The districts which perform the most elemental water service are those, such as the Metropolitan District of Massachusetts, Metropolitan Water District of Southern California, and the Greater Winnipeg Water District, which sell raw water at wholesale to the water systems of participating municipalities.

The chief fault of the water wholesaling function is that it results in duplication of facilities for water treatment and distribution and consequently in duplication of expense. For example, each local government which purchases raw water must provide a treatment plant and pumping stations to distribute water to local consumers, and in addition, it must hire technicians to operate its water system, administrative personnel to manage it, and clerical help to do the office work such as billing the local customers. When several local governments within one metropolitan area must each provide similar facilities and personnel to operate them, there is a

duplication of expenses which could be eliminated by having these services performed by a single organization.

Both the Metropolitan Water District of Massachusetts, and the Metropolitan District of Southern California deliver raw water to participating municipalities at their boundaries, but the Greater Winnipeg Water District requires each member municipality to construct its own individual supply lines to the district's aqueduct. Failure to enforce this policy has caused a serious situation to arise in this district. Eleven of the fourteen participants have never bothered to acquire an aqueduct connection. Instead they buy water from the systems of municipalities with aqueduct connections. Ten of these eleven municipalities, five of which are district members and five of which are not, buy water from the city of Winnipeg. The five member municipalities were being supplied by Winnipeg when the district was established. However, Winnipeg has a contract with only one of these municipalities for continued service and consequently, no assurance that the others will continue to be customers of the city. Because of this, water-service planning for Winnipeg must be based on assumptions over which it has no control. Without assurance that its ten customers will continue to buy water, Winnipeg will find it difficult to plan reservoirs and pumping stations to meet expanding water demands.

Another district which wholesales water is the Greater Vancouver Water District, but it differs from those described above in that it acquires raw water, treats it and then sells the treated water to participating

municipalities. Although selling treated water at wholesale eliminates the duplication of expenditures which result when each participant must operate its own treatment plant, there is still a duplication of expense for pumping facilities and for personnel to operate and administer the local water system.

The East Bay Municipal Utilities District is also a wholesaler of treated water, but it distributes the water to local consumers of member municipalities which leaves the local governments only the expenses of collecting water bills from the consumers. This type of wholesale operation comes closest to achieving the completely integrated water service possible in a district which sells water at retail.

The completely integrated metropolitan water system is one which distributes treated water to local customers and bills the individual consumer for water used. The Washington Suburban Sanitary District is such an organization. The system which sells water at retail can eliminate all of the expense of duplication which is incurred in a wholesaling operation. However, difficulties are encountered in establishing an organization to sell water at retail which are not faced in creating one which sells water at wholesale. For example, the establishment of an agency to retail water involves the abandonment of some existing facilities such as local treatment plants which are replaced by a central plant. The organization which sells water at retail, however, can in the long run provide a less expensive service than one which permits duplication of personnel and facilities.

Financing. --Metropolitan districts generally have two major sources of income. These are revenues from tax levies and revenues from the sale of water. Some districts have a third source which is charges for annexation. With funds from these sources, metropolitan districts pay both capital costs, which are interest and principal payments on borrowed money, and operating costs which are the expenses of operating and maintaining the water system.

Operating costs are ordinarily met with fees and charges received from the sale of water. In many metropolitan districts, such as the Greater Winnipeg Water District, the Metropolitan Water District of South California and the Washington Suburban Sanitary District, the water rate is set to produce sufficient revenues to meet the cost of operations. Where possible, charges for water service should be based upon the amount of water consumed, as an early experience of the Metropolitan Water District of Massachusetts demonstrated. Originally, operating costs of this district were charged to members in proportion to their respective assessed valuation and their respective populations. Since there was nothing in this apportionment to restrain water use, a tremendous consumption of water resulted. In 1904, when costs were reapportioned on the basis of assessed valuations and water consumption, a marked drop in water use resulted.

Capital costs are usually met with revenues from taxes and from annexation charges in those districts which collect membership fees.

Capital costs of the Greater Winnipeg Water District are paid with proceeds from a tax levied on all land within the district, but not improvements on the land. Since it was intended as a levy on both current and future benefits, this tax is assessed against land which is not served with district water, as well as land which is served. However, the effectiveness of the tax as a levy on future benefits was greatly reduced by a clause in the water district act which permitted member municipalities to withdraw from the district any of their lands not being served with water. Consequently, every municipality in the district except the city of Winnipeg used this means to withdraw large sections of land from the district tax roles.

Capital costs of the Washington Suburban Sanitary District are met by two different taxes, a general property tax and a front foot assessment on all lands abutting water mains. Because much of the Washington Suburban Sanitary District was originally not served with water, a general property tax which covered all capital costs, such as the tax levied in the Greater Winnipeg Water District, was considered unfair to those areas not yet served. On the other hand, it was felt that those properties served should not have to pay all capital costs, because capital costs include improvements such as reservoirs, pumping stations, treatment plants, and feeder mains which eventually benefit properties not immediately supplied with water. The decision was made to levy a moderate general property tax on all taxable land within the district and a front-foot benefit assessment on all lands abutting water mains. Revenues from the front-foot

assessment, which is charged to both developed and undeveloped properties, pay a major share of the capital costs. These front-foot charges may be paid over a forty year period in annual installments, a feature which has done much to permit construction of water systems in sparsely settled suburban areas.

Capital costs of the Metropolitan Water District of Southern California are paid with revenues from ad valorem taxes and from annexation charges. The ad valorem tax is levied by the water district board on all taxable property within the district and is, in theory, collected by each local government and passed along to the district. However, instead of actually collecting this tax, a municipality may choose to pay its obligation from water revenues or from other funds. Annexation charges or admission fees which are collected from all new territory have been an important source of income for the district. These fees which are customarily paid over a forty year period have brought the district over 16 million dollars and payments are being collected on an outstanding balance of 170 million dollars. Over eighty per cent of the district's revenues come from ad valorem taxes and annexation charges.

Metropolitan districts borrow money by issuing bonds, and most of them have the power to issue general obligation bonds. Districts are usually limited in the amount of money they may borrow. The Metropolitan Water District of Southern California, for example, may borrow construction funds provided the bonds issued do not exceed fifteen per cent

of the total assessed valuation of taxable property within the district, and the Washington Suburban Sanitary District may borrow up to fourteen per cent of the district's total assessed valuation.

Bond issues generally must be approved by the district voters. Approval of a general obligation bond issue in the Metropolitan Water District of Southern California requires an affirmative vote by a simple majority of district voters, not the two-thirds majority which is required for approval of a bond issue in cities and towns. The Washington Suburban Sanitary District is unusual in that its commission may issue general obligation bonds as required, without referendum.

Finances of the Greater Vancouver Water District are unusual because this district does not have the power to tax. Its income, like that of an authority, is limited to charges for the sale of water, and these revenues must pay both fixed costs and operating expenses. Although some districts may build up a cash reserve, the yearly income of the Greater Vancouver Water District, as nearly as possible, must equal its expenditures. At the beginning of each year, capital costs and operating expenses are estimated, and water rates to member municipalities are adjusted to these estimates. These estimates are subject to revision at any time during the year, and the water rate may be raised or lowered accordingly.

Authorities

Authorities are similar to metropolitan districts in that they are ad hoc agencies through which governments may provide needed services to their citizens. However, authorities differ from metropolitan districts because the services of authorities must be provided on a self-sustaining, self-liquidating basis without financially obligating the government or governments which established the authority. According to J. Raymund Hoffert, the two most important requirements of an authority are:

... (1) that it shall not pledge the credit of the government creating it, and (2) that it shall provide a self-liquidating service, the charges for which shall amortize the original costs and meet all operating expenses, repairs, and depreciation, as well as furnishing, usually, some reserve against emergencies.¹⁵

Advantages and disadvantages. -- Authorities offer many of the same advantage. which are offered by metropolitan districts including the ability to provide water service on a metropolitan basis, the ability to cross jurisdictional boundaries, and the ability to reduce competition between local governments for water rights. In addition, authorities do not have the expense of tax assessment and collection procedures because they do not have the power to levy taxes.

Authorities also have many of the same disadvantages of metropolitan districts. For example, the creation of an authority adds another autonomous agency to the metropolitan area, and it also takes the control of a government function out of the hands of local governing bodies. Authorities have the following additional disadvantages. They borrow money by

issuing revenue bonds which usually have higher interest rates than the general obligation bonds which many metropolitan districts may issue. Another objection which has been raised is that authorities, since they operate primarily on revenues from their goods and services, may resist undertaking needed functions or extending their services unless they can be assured of making a profit.

Methods of establishment. -- Authorities, like metropolitan districts, are created by state or local governments and are authorized to function by state legislatures through either special or general enabling acts. Among the states which have general enabling acts for authorities are Michigan and Pennsylvania. The Michigan act allows any combination of two or more cities, villages, or townships to incorporate a water authority, while the Pennsylvania act permits one or more municipalities to establish one.

The establishment of the Puerto Rico Aqueduct and Sewerage Authority is of special interest because its creation as an agency of the commonwealth by the legislature of Puerto Rico made the government of Puerto Rico responsible for all public water service on the island.¹⁶ Until 1941 water service in Puerto Rico was supplied by municipalities, but most of the municipal systems were so inadequate that the government decided it should assume the responsibility of water service, and it acquired, without compensation, all municipal water systems. However, the city of San Juan brought legal action against the Commonwealth

demanding compensation for the loss of its water system. The law suit was carried to the Supreme Court of Puerto Rico which decided that since both municipal and public corporations are creatures of the state, the taking of municipal water systems by the Commonwealth resulted only in a change in the administration of the property and was, therefore, legal despite the absence of compensation.

Organization, administration, and membership. --Like metropolitan districts, authorities are administered by policy making boards or commissions of either appointed, elected, or ex officio representatives.

The number of votes permitted member municipalities may also be weighted. For example, in the Southeast Oakland County Water Authority in Michigan each board member is permitted one vote for every 250 million gallons of water, or fraction thereof, delivered to his community during the previous year.¹⁷ The apportionment of votes on the basis of water consumption appears to be a satisfactory method in an authority because it operates primarily on revenues from the sale of water, and the largest water consumers, therefore, pay the largest share of the water-system costs.

The limits of authorities may be coterminous with jurisdictional boundaries, or they may cut across these boundary lines and in this way include only part of a local government within the area of the authority. Authorities may provide for extending their boundaries. The Southeast Oakland County Water Authority may extend its limits by having the

legislative bodies of member municipalities amend the authority articles of incorporation. Other authorities such as the Cobb County-Marietta Water Authority in Georgia have no provision for adding new territory.¹⁸ However, since the Cobb County-Marietta Water Authority is permitted to extend water service on a contract basis to areas outside of its corporate boundaries, there has been no pressure to enlarge its area.

Powers and duties. -- Authorities are generally given the same corporate powers as those granted metropolitan districts with two important exceptions. Authorities are not granted the power to tax, and they may not issue obligation bonds. They may, however, issue self-liquidating revenue bonds.

Many authorities such as the Cobb County-Marietta Water Authority are empowered to exist perpetually, but authorities in Pennsylvania are limited to fifty years duration at which time the water system reverts to the municipality or municipalities which created the authority. Because of a constitutional provision which prohibits municipalities in Pennsylvania from borrowing an amount exceeding seven per cent of the total assessed value of property within their borders, many Pennsylvania municipalities are not able to finance local waterworks. They therefore create a water authority which may borrow outside the municipal debt limit provided that its indebtedness is repaid within forty years from revenues of the corporation. Therefore, the time limit of fifty years on the life of an authority

allows the local government or governments which created it to take over the water system at the end of fifty years.¹⁹

Authorities may also be restricted in the use of certain powers. For example, authorities in Pennsylvania may not acquire an existing water system by eminent domain, although the owners of existing waterworks may lease, grant, lend, or convey their system to an authority upon mutually agreeable terms. This provision keeps an authority from acquiring a water system from an unwilling owner. As a further protection to the owners of existing systems, an authority in Pennsylvania may not construct, acquire, or operate a duplicate or competing system.

The water service duties or functions of authorities closely parallel those of metropolitan districts. There are authorities which sell water at wholesale and those, such as the Puerto Rico Aqueduct and Sewer Authority, which sell water at retail.

The Cobb County-Marietta Water Authority is unusual because it may function either as a wholesaler or a retailer of treated water. This authority normally sells water at wholesale to participating local governments, but in areas where no local distribution facilities exist, it may sell water directly to individual consumers.

The Southeast Oakland County Water Authority in Michigan is unusual in that it functions as a "middle man." Most authorities originally obtain raw water which they either treat and then resell or which they sell untreated to member municipalities. However, the Southeast Oakland

County Water Authority buys treated water from the city of Detroit and resells it to the distribution system of participating municipalities who assume the responsibilities of retailing to local customers.

Financing. --Since authorities are not granted the power to tax, their revenues are derived largely from charges for water service. Because of this, the finances of authorities are affected in the following ways.

First, only those who actually consume water pay the costs of the authority, and while this is sometimes cited as a virtue, it eliminates the possibility of levying a future benefit assessment such as is possible in many metropolitan districts. Next, authorities which issue revenue bonds have to pay an interest rate for borrowed money which is higher than that paid by organizations which issue general obligation bonds since revenue bonds are considered a greater financial risk than are general obligation bonds.

The Southeast Oakland County Water Authority has a financial arrangement unusual for authorities because it is permitted to pay part of its capital costs by assessing members for estimated future demands for water. Each member municipality submitted an estimate of its maximum daily demand in 1970, and the authority's water system was designed in 1953 on the basis of the combined estimate. Half of the annual capital costs of the authority are assessed to member municipalities each year on the basis of these estimates. Each member's estimate of future demand was computed as a percentage of the total

estimate, and this percentage determines a member's share of the annual assessment. This share is payable whether or not any water was taken during the preceding year, and it may be paid by member municipalities either from tax collections or from the general fund. When these estimates are reviewed in 1970, any community which has estimated low will have to make a lump sum retroactive payment. Funds for the other half of the fixed costs plus operating expenses come from water sales to participating municipalities.

Federated Metropolitan Government

The metropolitan federation, as an organizational alternative through which water service can be provided on a metropolitan basis, has some advantages which other alternatives do not have. In a metropolitan federation, the responsibility for providing certain services and functions, which are considered metropolitan in nature, is given to a central metropolitan government. The Municipality of Metropolitan Toronto, for example, is responsible for water supply, sewage disposal, housing, financing of education, provision of arterial highways, metropolitan parks and over-all planning.²⁰ Services which are not relinquished to the metropolitan government continue to be the responsibility of local governments within the federation. The federated metropolis is a compromise solution to the problem of unified metropolitan government control over the entire area, and local governments are usually more favorable to this form of metropolitan government in which they retain their autonomy.

Advantages and disadvantages. --The foremost advantage of the metropolitan federation is that it eliminates the need for cooperative agreements, authorities, metropolitan districts and any other contractual agreements or ad hoc agencies for providing water service. A department of the metropolitan government becomes responsible for supplying water to the entire area. This eliminates the criticism often leveled at both authorities and metropolitan districts, that the administration of water services is removed from government control. In addition to these advantages offered by the other alternatives. These include such things as being able to cross jurisdictional boundaries and offering an area-wide approach to water supply.

On the negative side, the metropolitan federation is a very complicated arrangement and therefore difficult to establish. It is often difficult to get several local governments to agree on such basic matters as financing and representation when a district or an authority is established to perform a single service, but when a metropolitan federation is established, agreement must be reached on the performance of many services. Adding to the difficulties confronted in establishing a metropolitan federation is the fact that local governments are generally reluctant to surrender any of their powers.

Methods of establishment. --Metropolitan federations are established by state legislative acts such as the special act of the Ontario Provincial Legislature which created the Municipality of Metropolitan Toronto in 1954.

The initial steps toward the creation of a metropolitan federation are usually taken by the local governments within the metropolitan area who first decide to form a federation and then petition the state governing body to pass the necessary enabling legislation.

Organization, administration, and membership. --Metropolitan federations are administered by metropolitan councils which are comprised of representatives of the local governments. If every local government has a representative on the metropolitan council, this body might easily become unwieldy. In the Municipality of Metropolitan Toronto, for example, there are thirteen member municipalities. Twelve of these are each permitted one representative on the metropolitan council, and the city of Toronto is also permitted twelve. Although this arrangement divides the voting power equally between Toronto and the other municipalities, a twenty-four man council is unwieldy.

The representatives on the Toronto Metropolitan Council are all elected officials of their local governments. They are the head councilman of each of the twelve smaller municipalities, ten members of the Toronto aldermanic board, and two other Toronto officials. Having the metropolitan council comprised of elected officials puts the final control over the federation in the hands of the metropolitan area voters.

Although the Toronto Metropolitan Council is responsible for metropolitan water service, it established a department of works to carry out the provisions of the act dealing with the water system.

Powers and duties.--The council of the metropolitan federation is given the same basic powers which a municipal council may exercise. These include such rights as eminent domain, the power to tax, and the police power. The council uses these broad powers, when applicable, to provide metropolitan water service, but in addition, it may be given specific powers which apply only to water supply. The Toronto Metropolitan Council, for example, was empowered to take over, without compensation, all existing facilities for the wholesale distribution of water, and to plan, finance, and operate any needed additions to the system. The Council is also given the power to fix wholesale water rates and to vary these rates between member municipalities if the cost of service to local governments differs enough to warrant variable rates. Other metropolitan water systems have considered varying the water rates to different members. Both the Greater Vancouver Water District and the Metropolitan Water District of Southern California investigated and discarded the idea on the theory that it would be too difficult to derive a formula which could assure a variable rate that was equitable. The Metropolitan Council was also empowered to enforce unified minimum standards for repairs and maintenance of local water distribution facilities. This provision was included in the metropolitan government act as an attempt to establish some degree of unification which would be needed if the metropolitan government should ever assume the responsibility of retailing water.

The Metropolitan federation may be established to sell water at wholesale or at retail. The Municipality of Metropolitan Toronto sells treated water at wholesale to member municipalities. Local governments retain the responsibility for operating their distribution systems and for fixing and collecting retail water rates. However, the retail rates must be approved by the Metropolitan Council. Because local governments have retained the retail distribution function, Metropolitan Toronto is still far from having a completely integrated water system.

Financing. -- The Metropolitan government might choose to finance metropolitan water service with tax revenues or with revenues from the sale of water as is done in the Municipality of Metropolitan Toronto where the wholesale water rate structure of the metropolitan water system is designed to provide sufficient revenues to pay all costs. Any profits which accrue to the Toronto metropolitan system are applied to prepayment of waterworks debts and any profits not required for prepayment of debts are applied to reducing the wholesale water rate.

Summary

No one of the four organizational alternatives discussed in this chapter can be considered the best arrangement for providing water service in every situation. Before one alternative can be selected over the others, the advantages and disadvantages of each should be evaluated with respect to local factors such as state imposed debt limitations,

the bonded indebtedness of local governments, and the record of inter-governmental relations. Only after all of the alternatives under consideration have been viewed in respect to local conditions can a wise selection be made.

CHAPTER IV

CONCLUSIONS AND RECOMMENDATIONS

The task of supplying water service in metropolitan areas is complicated by many factors. One factor is the tendency of Americans to live in metropolitan areas. Between 1950 and 1960 the number of standard metropolitan areas increased from 168 to 192 and the number of people living in these areas rose from 84 million to 109 million. As a result of population concentration in metropolitan centers, demands for water service are being magnified in these areas. Another difficulty in planning metropolitan water service has been encountered in trying to overcome the traditional approach to municipal water supply under which each political unit is responsible for supplying the needs of its citizens. This approach, if followed today, could cause innumerable conflicts over water rights because of the large number of local governments such as cities, towns, townships, and counties within metropolitan areas. In 1958, there was an average of 86 local governments in each standard metropolitan area. If water supply in the metropolitan area is made the responsibility of a single agency or a single government, the possibility of intergovernmental friction over water rights is greatly reduced.

In addition to the elimination of possible intergovernmental conflicts, a metropolitan water system offers the possibility of reducing expenditures by local governments for duplicate water service functions.

Even the least integrated metropolitan water system, the one which sells raw water at wholesale, effects major economies because its participants do not have the duplicate expense of constructing individual supply lines to a source of raw water. Moreover, the more functions which the metropolitan system assumes, such as water treatment and water distribution to local consumers, the greater will be the reduction in duplicate expenditures by local governments. Individually, local governments may not be able to afford the high costs of providing an adequate water supply for their citizens, but the combined resources of several municipalities may be sufficient to finance a water-supply system which can supply the needs of all.

Nonengineering studies are an essential element of long range water-service planning. Without such forecasts as to the number of people the water system will serve, the area in which these people will be located, the quantity of water which they will consume on peak demand, the industrial water demand of the area, the possible location of future industries, and the probable future industrial consumption of water, the waterworks official lacks information needed to plan such facilities as pipelines, treatment facilities, and pumping stations to adequately meet future demands.

The city planning department is equipped to make the nonengineering studies. Several of these nonengineering studies including population forecasts, future land use, transportation, and economic base studies are surveys which the planner will conduct regardless of their need for water service planning. Therefore, a duplication of expenditures can be avoided if the planners of water-service use data compiled by the city planner. By using the city planners basic studies, the water-service planner can also save the time which he would spend conducting similar surveys.

The special water system studies which the city planner should conduct include a survey of the possible alternatives for organizing metropolitan water service. In preparing this report, the city planner should keep in mind the following points about the alternatives.

Cooperative agreements. --Of the alternatives being considered, the cooperative agreement is the least difficult to put into effect. It does not require the creation of either an independent agency, as do metropolitan districts and authorities, or of a central governing body as does a metropolitan federation, and it usually does not require state enabling legislation. In an area where a central city has successfully provided water service to various local governments through cooperative agreements, an extension of this service to all local governments in the metropolitan area might be the best means of effecting a metropolitan service. A difficulty encountered in providing metropolitan water service with this alternative is that cooperative agreements tend to furnish service

to a limited number of participants because cities which may be willing to sell surplus water to other local governments are many times reluctant to undergo the expense of enlarging their water systems for the benefit of other municipalities.

Metropolitan districts. --Because it has the power to levy taxes, the metropolitan district can offer special advantages to an area with large sections of undeveloped land. The undeveloped land can be taxed to help pay the costs of the water system. The power of the district to levy taxes even makes possible the taxing of land which does not have water service available to it. In the Washington Suburban Sanitary District, land which is not served with water is taxed on the contention that water service will be available to it at sometime in the future and that, in the meantime, this land is increasing in value as a result of the district's operations. However, the metropolitan district is an autonomous agency whose establishment adds another self-governing organization to the metropolitan area and takes the control over the service it provides out of the hands of local governments.

Authorities. --Authorities, which derive their income primarily from the sale of water, may be best suited to an area with a relatively small amount of undeveloped property and one where most of the property is served with water. In such an area there should be little need for a future benefit assessment since most properties would be receiving immediate benefits. The authority, because its income is limited for the

most part to revenues from water sales, does not have the expense which many districts incur in levying and collecting taxes.

Federated metropolitan government. --The federated metropolitan government is the most promising arrangement for providing unified government services on a metropolitan basis. The metropolitan federation places water service for the entire metropolitan area under a department of the metropolitan government. This arrangement not only keeps water service under governmental control but also eliminates the need for cooperative agreements, metropolitan districts, authorities, or any other contractual agreement or quasi-governmental agency for furnishing water service. The biggest drawback to the metropolitan federation is the difficulties encountered in organizing it and in getting local governments to relinquish powers to a central governing council.

By conducting the essential nonengineering studies, the city planner can make a valuable contribution to water-service planning, but he must demonstrate this to municipal officials. The planner must take the initiative in informing water works officials of the information and resources which are at their disposal in the planning office, and he should offer to assist them in any way possible.

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